NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

RESIDUE AND TILLAGE MANAGEMENT REDUCED TILL

(Acre)
CODE 345

DEFINITION

Managing the amount, orientation, and distribution of crop and other plant residue on the soil surface year-round, while limiting the soil-disturbing activities used to grow and harvest crops in systems where the field surface is tilled prior to planting.

PURPOSE

This practice is applied as a part of a conservation management system to support one or more of the following purposes:

- Reduce sheet, rill and wind erosion – Resource Concern (SOIL EROSION - Sheet, rill, & wind erosion).
- Reduce tillage-induced particulate emissions – Resource Concern (AIR QUALITY IMPACTS - Emissions of Particulate Matter - PM - and PM Precursors).
- Maintain or increase soil quality and organic matter content – Resource Concern (SOIL QUALITY DEGRADATION –Organic matter depletion).
- Reduce energy use – Resource Concern (INEFFICIENT ENERGY USE – Farming/ranching practices and field operations).
- Increase plant-available moisture – Resource Concern (INSUFFICIENT WATER –Inefficient moisture management).

CONDITIONS WHERE THIS PRACTICE APPLIES

This practice applies to all cropland.

This practice includes tillage methods commonly referred to as mulch tillage or conservation tillage where the entire soil surface is disturbed by tillage operations such as chisel plowing, field cultivating, tandem disking, or vertical tillage. It also includes tillage/planting systems with few tillage operations (e.g. ridge till) but which do not meet the STIR criteria for Florida NRCS conservation practice standard Residue and Tillage Management - No Till (code 329).

CRITERIA

General Criteria Applicable To All Purposes Stated Above

Uniformly distribute residues over the entire field. Removing residue from the row area prior to or as part of the planting operation is acceptable.

Do not burn residues.

Determine Soil Tillage Intensity Rating (STIR) value based on all field operations that are performed during the crop interval between harvest of the previous cash crop and harvest or termination of the current cash crop (includes fallow periods). To comply with this practice, STIR value cannot exceed 80, and no primary inversion tillage implements (e.g., moldboard plow) can have been used.

Avoid or minimize to the extent practical impact to cultural resources, wetlands, and Federal and State protected species during planning, design and implementation of this conservation practice. For more information, see National and Florida NRCS policy, General Manual (GM) Title 420-Part 401, Title 450-Part 401, and Title 190-Parts 410.22 and 410.26; National Planning Procedures Handbook (NPPH, Handbooks Title 180 Part 600) FL Supplements to Parts 600.1 and 600.6; National Cultural Resources Procedures Handbook (NCRPH, Handbooks Title 190 Part 601); and The National Environmental Compliance Handbook (NECH, Handbooks Title 180 Part 610).

Additional Criteria To Reduce Sheet and Rill Erosion and Reduce Wind Erosion

Use the current approved water and/or wind erosion prediction technology to determine the:

- amount of randomly distributed surface residue needed;
- time of year the residue needs to be present in the field, and
- the amount of surface soil disturbance allowed to reduce erosion to the desired level.

All other practices in the management system should be considered when make these calculations.

In ridge-till systems, plan ridge height and ridge orientation to manage runoff and minimize erosion, with a maximum row grade of 4%.

Additional Criteria to Reduce Tillage-Induced Particulate Emissions

Reduce or modify tillage operations that create dust, especially during critical air quality periods.

Adopt tillage practices that reduce particulate emissions.

Additional Criteria To Maintain or Improve Soil Quality

Evaluate the cropping system using the current approved soil conditioning index (SCI) procedure. To comply with this practice, the cropping system must result in a value of zero or higher. Ensure that calculations account for the effects of other practices in the management system.

Additional Criteria To Increase Plant-Available Moisture

Reducing Evaporation from the Soil Surface. Maintain a minimum 60 percent surface residue cover throughout the year.

The minimum 60 percent residue cover must be maintained by any management operation, such as baling or grazing, which will remove part of the residue.

Additional Criteria to Reduce Energy Use

Reduce the total energy consumption associated with field operations by at least 25% compared to the benchmark condition. Use the current approved NRCS tool for determining energy use to document energy use reductions.

CONSIDERATIONS

General - Removal of crop residue, such as by baling or grazing, can have a negative impact on resources. These activities should not be performed without full evaluation of impacts on soil, water, animal, plant, and air resources.

Reduced till may be practiced continuously throughout the crop sequence, or may be managed as part of a residue management system that includes other tillage methods such as no till. Selection of acceptable tillage methods for specific site conditions may be aided by an approved STIR technology.

Production of adequate amounts of crop residue necessary for the proper functioning of this practice can be enhanced by selection of high residue producing crops and crop varieties in the rotation, use of cover crops, and adjustment of plant populations and row spacing.

When providing technical assistance to organic producers, residue management, and tillage activities should be consistent with the USDA – Agricultural Marketing Service National Organic Program standard.

Increasing Soil Organic Matter Content – Carbon loss is directly related to the volume of soil disturbed, the intensity of the disturbance, and the soil moisture content and soil temperature at the time the disturbance occurs. The following guidelines can make this practice more effective:

- Shallow soil disturbance (1-3 inches) releases less CO_2 than deeper operations.
- When deep soil disturbance is performed, such as by subsoiling or fertilizer injection, make sure the vertical tillage slot created by these implements is closed at the surface.
- Planting with a single-disk opener, no-till drill will release less CO_2 than planting with a wide-point hoe/chisel opener air seeder drill.
- Soil disturbance that occurs when soil temperatures are below 50° F will release less CO_2 than operations done when the soil is warmer.

Improving Soil Health/Quality - Producers can achieve major improvements in soil health by using the following activities/practices:

- Use a diverse crop rotation, incorporating multiple crop types (cool-season grass, cool-season legume/forb, warm-season grass, warm-season legume/forb) into the crop rotation.
- Plant a cover crop after every cash crop in the rotation. Multi-species cover crop mixes provide greater benefits than single-specie cover crops.
- Using undercutting tools rather than burying tools will enhance accumulation of organic material in the surface layer.
- Conducting any soil-disturbing field operation when soil moisture is optimal, neither excessive nor too dry, will help maintain soil tilth, and reduce the need for additional tillage in the future.

Increasing Plant-available Moisture – Tillage and planting operations done on the contour will help slow overland flow and increase infiltration, thus increasing the potential for increased water storage in the root zone.

Providing Food and Escape Cover for Wildlife – Avoid tillage and other soil and residue/stubble disturbing operations during the nesting season and brood-rearing period for ground-nesting species.

Forgoing fall shredding or tillage operations will maximize the amount of wildlife food and cover during critical winter months.

Leaving rows of unharvested crop standing at intervals across the field or adjacent to permanent cover will enhance the value of residues for wildlife food and cover. Leaving unharvested crop rows for two growing seasons will further enhance the value of these areas for wildlife.

An approved habitat evaluation procedure will aid in determining the appropriate time and amount of residue and stubble needed to provide adequate food and cover for the target wildlife species.

PLANS AND SPECIFICATIONS

Prepare specifications for establishment and operation of this practice for each field or treatment unit. In the specifications, identify all of the following that are appropriate:

Plans and Specifications need to include:

- The resource concern to be treated or the purpose for applying the practice
- The following documented in RUSLE2 printout:
  - Planned crop(s)
  - The amount of residue produced by each crop.
  - All field operations or activities that affect:
    - Amount of residue cover
    - Residue orientation
    - Surface disturbance
  - The amount of residue (pounds/acre or percent surface cover) required to accomplish the purpose, and the time of year it must be present
  - The maximum STIR value allowed to accomplish the purpose, and the time of year that soil disturbance is allowed
  - The minimum SCI value required to accomplish the purpose

Record the specifications using the Practice Implementation Requirements document.

OPERATION AND MAINTENANCE

Evaluate/measure the crop residues cover and orientation for each crop to ensure the planned amounts and orientation are being achieved.

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